CLAIMS

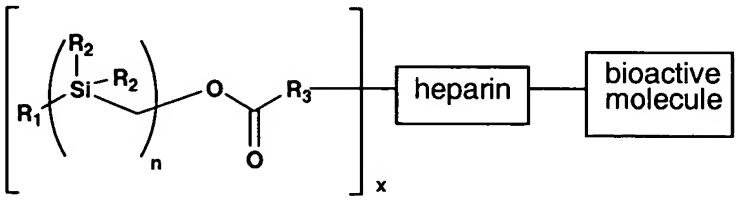
What is claimed is:

1. A wound dressing comprising a polymeric film having complexed thereto by hydrophobic interaction a construct comprising a polyanion covalently bonded to a hydrophobic prosthetic moiety, with a first bioactive molecule directly complexed to the polyanion.

2. The wound dressing of claim 1 wherein the hydrophobic prosthetic moiety is a linear repeat dimethylsilane group, a benzyl or phenyl group covalently bound to at least one dimethylsilane group, styrene, cholesterol, a sterol, a fatty acid, an alkyl chain or a phospholipid.

3. The wound dressing of claim 1 wherein the polyanion is a heparin-activity molecule, collagen, a negatively charged chitosan derivative, polyacrylic acid, a chemically-modified dextan, a sulfated polysaccharide, sodium alginate or albumin.

4. The wound dressing of claim 1 wherein the polyanion covalently bonded to a hydrophobic prosthetic moiety, with a first bioactive molecule directly complexed to the heparin-activity molecule, is a construct of Formula I:



I

wherein

R_1 is an C_{1-18} alkyl or C_{6-32} aryl group,

each R_2 is independently selected from the group consisting of C_{1-18} alkyl and C_{6-32} aryl,

R_3 is N or O,

n is a number from 1 to 10,

x is a number from 1 to about 30, and

heparin is a heparin-activity molecule bonded to R_3 via a covalent bond, thereby forming a silyl-heparin covalent complex, with a first bioactive molecule directly complexed to the heparin-activity molecule.

5. The wound dressing of claim 4, wherein the silyl-heparin covalent complex has a dissociation rate from the polymeric film determined by the value of n and x.

6. The wound dressing of claim 4, wherein the silyl-heparin covalent complex comprises [benzyl-bis(dimethylsilylmethyl)]-(N-heparinyl)-carbamate or [benzyl-tris(dimethylsilylmethyl)]-(N-heparinyl)-carbamate.

7. The wound dressing of claim 4, wherein the heparin-activity molecule is heparin, heparan sulfate, hyaluronic acid, dextran, dextran sulfate, chondroitin sulfate, dermatan sulfate, a molecule including a mixture of variably sulfated polysaccharide chains composed of repeating units of D-glucosamine and either L-iduronic or D-glucuronic acids, salts of any of the foregoing, derivatives of any of the foregoing, or combinations of any of the foregoing.

8. The wound dressing of claim 1, wherein said first bioactive molecule is an adhesive molecule, a growth factor molecule or a therapeutic molecule.

9. The wound dressing of claim 8, wherein the adhesive molecule is collagen, fibronectin, laminin, vitronectin, thrombospondin, gelatin, polylysine, polyornithine, a peptide polymer containing at least one adhesive sequence and at least one heparin binding sequence, a sulfated complex carbohydrate, dextran sulfate, a growth hormone, a cytokine, a lectin, or peptidic polymers thereof.

10. The wound dressing of claim 8, wherein the growth factor molecule is a fibroblast growth factor, platelet-derived growth factor, vascular endothelial growth factor, hepatocyte growth factor, placental growth factor, insulin-like growth factor, nerve growth factor, a neurotrophin, heparin-binding epidermal growth factor, transforming growth factor-β, bone morphogenetic protein 2, osteogenic protein 1 or keratinocyte growth factor.

11. The wound dressing of claim 8, wherein the therapeutic molecule is C-X-C chemokine, interferon gamma, macrophage inflammatory protein-1, an interleukin, IL-1, IL-2, IL-3, IL-4, IL-6, IL-7, IL-8, interferon-gamma inducible protein-10, RANTES, an HIV-tat-transactivating factor, granulocye/macrophage-colony stimulating factor, platelet factor-4 (PF-4), endostatin, angiostatin, amino glycoside antibiotic, streptomycin, gentimicin, tobramycin, neomycin B, actinomycin D, daunorubicin, doxorubicin, bleomycin, rapamycin or paclitaxol.

12. The wound dressing of claim 4, wherein said first bioactive molecule is directly complexed to the heparin-activity molecule by affinity complexation.

13. The wound dressing of claim 1, wherein the polymeric film is a synthetic polymeric film.

14. The wound dressing of claim 13, wherein the polymeric film comprises polyurethane, poly tetrafluoroethylene, extended poly tetrafluoroethylene, copolyester, ethyl vinyl acetate, polyether block amides, polycaprolactone, polylactide, polyglycolide, or a cellulose derivative.

15. The wound dressing of claim 14, wherein the synthetic polymeric film is ethyl vinyl acetate.

16. The wound dress of claim 1, wherein the polymeric film is a biodegradable polymeric film.

17. The wound dressing of claim 1, further comprising an absorbent layer in contact with one side of the polymeric film, with the construct comprising a polyanion covalently complexed to a hydrophobic prosthetic moiety, with a bioactive molecule directly bonded to the heparin-activity molecule, complexed to the obverse side.

18. The wound dressing of claim 17, wherein the absorbent layer comprises cotton, agar, chitosan or a combination thereof.

19. The wound dressing of claim 1, wherein the polymeric film further comprises a plurality of perforations that allows the passage of fluids from one side of the film to the opposite side of the film.

20. The wound dressing of claim 1, wherein the polymeric film is impermeable to fluids.

21. The wound dressing of claim 4, wherein the molecule of Formula I comprises an n value equal to 4 and an x value equal to 4.

22. The wound dressing of claim 4, wherein the molecule of Formula I comprises an n value equal to 2 and an x value equal to 6.

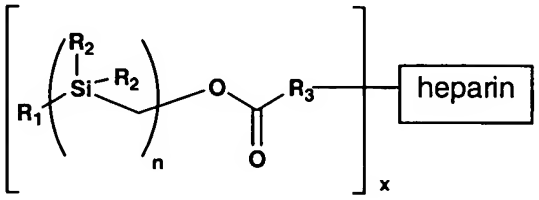
23. The wound dressing of claim 1, wherein the construct comprising a polyanion covalently bonded to a hydrophobic prosthetic moiety, with a first bioactive molecule directly complexed to the polyanion, further comprises a second bioactive molecule complexed to the polyanion.

24. The wound dressing of claim 23, wherein the second bioactive molecule is an antibiotic.

25. A method for making a wound dressing, comprising:

providing a wound contacting polymeric film;

providing a molecule of Formula II:



II

wherein

R_1 is an C_{1-18} alkyl or C_{6-32} aryl group,

each R_2 is independently selected from the group consisting of C_{1-18} alkyl and C_{6-32} aryl,

R_3 is N or O,

n is a number from 1 to 10, and

heparin is a heparin-activity molecule bound to the silyl moiety via covalent bonding, wherein x is from 1 to about 30 for each heparin-activity molecule, thereby forming a silyl-heparin complex;

attaching the sily-heparin complex of Formula II to the polymeric film by hydrophobic interaction; and

attaching a first bioactive molecule to the heparin-activity molecule.

26. The method of claim 25, wherein providing the molecule of Formula II further comprises selecting a dissociation rate of the molecule of Formula II from the polymeric film determined by the value of n and x.

27. The method of claim 25, further comprising attaching a second bioactive molecule to the heparin-activity molecule.

28. The method of claim 27, wherein the second bioactive molecule is an antibiotic.

29. A method for treating a wound, comprising:

providing a wound dressing of claim 1; and

contacting the wound dressing to the wound.

30. The method of claim 29, wherein the wound is a surface lesion.

31. The method of claim 29, wherein the wound is an internal wound.

32. The method of claim 31, wherein the wound dressing comprises a biodegradable polymeric film.

33. The method of claim 29, wherein the wound dressing comprises a first bioactive molecule that is an adhesive molecule, whereby the contacting surface is non-thrombogenic and promotes cellular adhesion.

34. A method for treating a wound, comprising:

providing a wound dressing of claim 4; and

contacting the wound dressing to the wound.

35. The method of claim 34, wherein the wound dressing comprises a silyl-heparin complex that has a dissociation rate from the contacting surface determined by the value of n and x.

36. The method of claim 34, wherein the wound dressing comprises a [benzyl-bis(dimethylsilylmethyl)]-(N-heparinyl)-carbamate or [benzyl-tris(dimethylsilylmethyl)]-(N-heparinyl)-carbamate silyl-heparin complex.

37. The method of claim 34, wherein the wound is a surface lesion.

38. The method of claim 34, wherein the wound is an internal wound.

39. The method of claim 38, wherein the wound dressing comprises a biodegradable polymeric film.

40. The method of claim 34, wherein the wound dressing comprises a first bioactive molecule that is an adhesive molecule, whereby the contacting surface is non-thrombogenic and promotes cellular adhesion.

41. The method of claim 34, wherein the wound dressing further comprises a second bioactive molecule.

42. The method of claim 41, wherein the second bioactive molecule is an antibiotic.

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